A COMPARISON OF LEITER AND WECHSLER TESTS OF INTELLIGENCE WITH INDIAN AND WHITE CHILDREN

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ABSTRACT

A study was conducted to determine whether the Leiter International Performance Scale (LIPS) provided a more adequate estimate of intelligence for Indian children than the Wechsler Intelligence Scale for Children (WISC). 4 groups of 10 children (urban white, rural white, urban Indian and rural Indian) matched on age, sex and socioeconomic status were tested on the LIPS, WISC and Wide Range Achievement Test (WRAT). Subjects ranged in age from 6 years 5 months to 8 years 11 months with a mean age of 7 years 8 months. A 2x2 factorial analysis was done for both subscale and full scale measures of the three tests used. Factors used in the analysis of variance were culture (Indian-white) and locale (urban-rural). An intercorrelation matrix on all variables was also prepared, and correlation coefficients among subsamples were compared for statistical significance.

The results indicated that Indian subjects did as well as white subjects on IQ tests except on the verbal tests in which the white subjects were superior. The LIPS did not prove to be more culture-fair to the English Indian child than the WISC-Performance (WISC-P) scale or the WISC-Full (WISC-F) scale but it was fairer to the Indian child than the WISC-Verbal (WISC-V) scale which underestimated the intelligence of the Indian child. The LIPS correlated significantly with WISC scores indicating that the LIPS is a valid measure of intelligence. The results indicated that the LIPS was as good a predictor of achievement as the WISC-F and WISC-V. Correlation coefficients did not differ among subsamples. IQ scores correlated highest with Arithmetic achievement.

Considering individual subsamples, IQ scores did not predict

achievement for three of the subsamples, i.e., urban Indian, urban white and rural white. For the rural Indian the WISC-F and WISC-V were good predictors of Arithmetic achievement.

The study indicated that rural children were as intelligent and were as high achievers as urban children. An incidental aspect of the study was the difficulty in matching subjects on the SES factor in the rural community which led to the hypothesis that the socioeconomic factor is an important variable in intelligence testing.

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The goals of education are to develop, through school instruction programs, the full potential of our children. On an individual basis this appears highly idealistic and the goal is probably not reached for the majority of students due to problems of motivation and/or work habits. For various minority groups, including the poor, the culturally and physically handicapped, the odds against this realization become extremely high as they also have serious social disadvantages to overcome.

Although the education of the Indian child has improved greatly over the last few years and curricula and teacher qualifications have hopefully provided more equal opportunities for all children, Blue & Gooderham (1970) pointed out, "it is still very doubtful whether Indian children who enter school today in fact gain the same educational benefits that other Canadian children enjoy" (p. 1). Integration of the Indian child into the education system has not guaranteed him an equal opportunity to succeed. The Indian child must contend with direct and indirect discrimination. The latter is harder for the student to cope with as it is more difficult to identify. Open or covert hostility to the Indian child affects his school performance and often the "different" child is easily streamed into a slow learner group and labelled a non-learner.

Success and progress in society have become more and more dependent on good response to academic instruction and school achievement. It is important for society to develop the potential abilities of its young people by adaptive teaching methods. Such adaptive methods require a valid assessment of individual potential. Too often the different child is streamed into a slower level of education erroneously by group tests

and/or achievement. For the pupils of middle-class urban cultures, reasonably valid instruments, like the Stanford Binet, conventional group intelligence tests, and the Wechsler Intelligence Scale for Children (WISC), have proven to be very useful tools for identifying individual potential (MacArthur, 1962). But for the child from the slum, the immigrant child or the Indian child from a different culture, conventional tools frequently do not permit him to obtain a true measure of his intelligence. He frequently drops out of the education system, and to a large extent, relinquishes his chance for success and potential leadership for his group (Dosman, 1962).

Increased mobility in recent years, growing self-awareness and self-identity, and the Indian's desire to improve his situation, has focussed awareness on the generally depressed economic situation and poor educational achievement of the Indian child (Dosman, 1972). Lane (1972) pointed out that 94% of all Canadian Indian students entering Grade I fail to complete Grade 12. It is in the interest of the whole society to check and reverse this situation.

Statement of Problem

The problem is one of adequately appraising the intellectual potential of Indian children who are experiencing learning or emotional difficulties, in the guidance departments of the school system and/or the various clinics or regional districts to which the child may be referred. Most conventional intelligence tests rely heavily on verbal ability and the Indian child usually has English as his second language. With a verbal test, there is the danger of penalizing such a child and labelling him slower than he is, depending on the degree of facility of thought or oral

reply in the English language. Therefore, a test is needed which will give the Indian child a fair assessment. The purpose of this study is to determine whether the Leiter International Performance Scale (LIPS) is a more adequate measure of intelligence for the Indian child than the more conventional and widely used Wechsler Intelligence Scale for Children (WISC).

Literature Review

The definition of intelligence has undergone various approaches. Such definitions tend to vary with different theoretical views of intelligence. Some emphasize convergent correlations, some emphasize functions which appear to be logically related to intelligence, or intelligence may be defined as purely operational, i.e., intelligence is what intelligence tests measure. Whatever approach is followed, it has become increasingly apparent that the unique learning history of the individual or group determines to a large extent how he uses his intelligence. In the cross-cultural study of intelligence, this individual unique learning history becomes paramount. Important variables affecting the cross-cultural approach to intelligence are genetic factors (Indian-white factor), socio-economic status (SES), urban-rural status and culture-reduced tests.

The literature review will deal with the concept of intelligence, the cross-cultural approach in the measurement of intelligence and the important variables affecting this approach.

Concept of Intelligence

Intelligence, as perceived by our society is a Western concept which has evolved through a series of different emphases. It is largely

influenced by the concept of Spearman's "g" factor, or general intelligence. General intelligence as described by Vernon (1969), falls into two major types - the verbal-education (v:ed factor) and the spatial-perceptual-practical (K: m factor). According to factorial conceptions of intelligence, three factors have been identified. These are first, Intelligence A which refers to innate potential and is considered not directly measurable. Secondly, general intelligence or Intelligence B "is the cumulative total of the schemata or mental plans built up through the individual's interaction with his environment, insofar as his constitutional equipment allows" (Vernon, 1969, p. 23). Thirdly, Vernon added the concept of Factor C which is that aspect of mental ability which is measured by an intelligence test.

A slightly modified concept of intelligence emerged when Cattell (1963) regarded two components of the general factor, namely the fluid (Gf-innate) and crystallized (Gc-learned skills) which he believed are measurable, the former by culture-free tests and the latter by the more conventional verbal intelligence tests. He believed that fluid (Gf) showed much greater variance than the Gc factor and that it was affected by personality traits.

Jensen (1973) referred to intelligence as a theoretical construct which accounts for the consolidation of learning into organized structures which permits its retrieval, generalization, and transfer to the solutions of new problems and to the facilitation of new learning. Jensen dealt with components of intelligence as associative ability (memory and serial learning) and cognitive ability (abstract reasoning tasks).

Sattler (1974) summarized and defined intelligence as "being a central 'fluid' kind of genetically determined basic ability which is modified by experience - the ways in which people use their intelligence are determined by the unique learning history of the individual" (p. 15). It is because of this "unique learning history" that makes testing of children from different cultures and learning experiences such a difficult problem.

In studies involving intelligence measurement, the researcher is dealing with Vernon's (1969) Intelligence C - i.e., measured intelligence (IQ) from which inferences must be made regarding general intelligence. Sattler (1974) pointed out that intelligence tests do not measure something fixed, innate and predetermined but rather sample learning based on general intelligence and reflect the richness of the environment in which the child functions and the extent to which he has been able to profit by this experience. Research has shown that IQ predicts school achievement (Bereiter, 1972, Jensen, 1970) but as Bereiter (1972) pointed out:

> It is not the only personal characteristic to do so. Besides a variety of mental abilities, of which IQ is a sort of summary, there are study habits, intellectual as against social interests, achievement motivation, independence of judgement, external locus of control and reflectivity as opposed to impulsivity. (p. 334)

Even though researchers and theorists have taken every precaution to arrive at an empirical concept of intelligence, in our society "tested intelligence is to a very considerable extent, what Alfred Binet and David Wechsler decided to make it" (Bereiter, 1972, p. 333).

In this study, the researcher dealt with Intelligence C, i.e., IQ scores. To approach it on any other level involved a subjective interpretation.

The Cross-Cultural Approach

According to Frijda and Jahoda (1966), for research to be traditionally and truly cross-cultural, a study should compare a Western industrial culture and a pre-literate tribal one. They pointed out that psychology arrived too late on the scene and that hardly any culture has been unaffected by Western ideas and ideologies. By studying Indian and white children in the same culture, the study is, strictly speaking, intra-cultural but through popular usage such research has come to be called cross-cultural. Brislin, Lonner and Thorndike (1973) after an extensive review of cross-cultural research defined the area as follows:

> Cross-cultural psychology is the empirical study of members of various culture groups who have had different experiences that lead to predictable and significant differences in behaviour. In the majority of such studies the groups under study speak different languages and are governed by different political units. (p. 15)

By applying this definition to the study of Indian and white children, we find that they come from different cultural groups who have different experiences which lead to differences in behaviour. The two cultural groups have different language backgrounds and live under differing political organization, i.e., the Indian under a traditionally paternalistic reserve system (Dosman, 1972) and the white under a municipal government.

A sample of the studies of the Indian-white "cross-cultural" approach now follows.

Indian-white studies. The majority of cross-cultural studies have found that the Indian child is disadvantaged (i.e., performs more poorly than the white child) in the testing situation (Lane, 1972; MacArthur, 1966;

Blue, 1969; Cundick, 1970; Elliott, 1969; Lesser, Fifer & Clark, 1965; Schubert & Cropley, 1972; Sattler, 1974; Turner & Penfold, 1952). Other studies, however, were not decisive in their findings and showed different kinds of tests to vary in fairness to the Indian child. In general, the less verbally dependent the test, the less it discriminates against the Indian child. Turner and Penfold (1952) assessed scholastic aptitude of the Indian children (Chippewas, Muncey and Oneidas) of the Caradoc Reserve, in Ontario. They described "scholastic aptitude", as the capacity to attain the general educational standards of the white school children, which they stressed is by no means restricted to intellectual capacity. They found that the Indian children did as well as the average white children (WISC norms) on the Performance scale of the WISC with a Mean IQ of 96.7. The Indian child did less well on the Verbal scale of the WISC (Mean IQ = 85.6, SD = 14.1) and on the group tests which were employed. With Grade 1 children, on the Henmon-Nelson Groups test, the Mean IQ for the Indian children was 85.0 while the Mean IQ of the white children was 98.1. On the Otis, the Mean IQ for the Indian children was 83.8 and the Mean IQ for the white children was 107.0. The Raven Progressive Matrices showed no significant differences for the age group 6-7-8, but for children 9-12 the differences became consistently more significant. It is plausible that the lack of motivation became more dominant with increased maturity. They also dealt with the many environmental handicaps that were apparent for the Indian children in the reserve community and concluded that differences were attributable to environmental differences and not to race differences.

In another study, Cundick (1969) studied American Southwest Indian children, largely Navajo and some Utes. The purpose of the study was to do individual intellectual assessment to see how their performance compared to the national norms and to see if the children were ready for inclusion into the regular classrooms. On the Wechsler Preschool and Primary Scale of Intelligence (WPPSI), prekindergarten Indian children and kindergarten Indian children (n=27) obtained Mean Verbal IQs of 63.9, Mean Performance IQs of 91.1 and a Mean Full Scale IQ of 74.69, all significantly lower than the national norms. For Grade 1, 2 and 3 Indian children (n=26) the WISC mean scores were as follows: a Mean Verbal IQ of 65.0 (significantly lower than the national norms), a Mean Performance IQ of 95.9 (not significantly different from the national norms) and a Mean WISC Full Scale IQ of 78.1 (significantly lower than the national norms). The Goodenough-Harris Draw a Man Test obtained no differences but the Peabody Picture Vocabulary Test (PPVT) resulted in significant differences at all grades from kindergarten to Grade 6.

In a study of Saskatchewan Indian children, Schubert and Cropley (1972) found a significant relationship between IQ and ethnic background, with "differences in IQ related to the amount of contact with the white, urban culture" (p. 295). The groups (Northern Indians, Central Indians, rural whites and urban whites) differed significantly in IQ. There was a significant interaction between type of test and ethnic background with Indian children obtaining higher Performance IQs than Verbal IQs. Schubert & Cropley concluded that such differences were due to "under-development of reflective verbal thought, not from a biologically

determined inadequacy" (p.295).

Research shows rather consistently that the Indian child is disadvantaged in the area of intellectual measurement (i.e., Intelligence C). The general pervading opinion on whether these differences are genetic or environmental in nature, is summarized by Cavalli-Sforza (1970). After an extensive review of present knowledge in interracial divergence in man, Cavalli-Sforza concluded that the differences observed are not likely attributable to genetic factors:

> The difficulties in the analysis of a polygenic character like IQ or related measurements, subject to mostly unknown environmental influences that may affect intellectual development-among which are early biological and psychological, as well as motivational factors - make conclusions on the basis of present knowledge unwarranted. (p. 122)

On the other hand, Jensen (1970), who adopted the more controversial approach to racial differences, i.e., that intellectual differences are genetic, made an excellent point when he stated that "IQ correlates with many external criteria, and at the most general level it may be regarded as a measure of the ability to compete in our society in ways that have economic and social consequences for the individual" (p. 127).

These differences between Indian and white children on measured intelligence indicate either genetic differences or environmental differences. This is the perennial nature-nurture controversy. While many inconsistencies exist in contemporary theory on environmental vs. genetic differences, present knowledge and research cannot answer the question. Indeed it may be insoluble but most researchers tend to support environmental differences due to cultural differences. The majority of researchers who have studied Indian and white children have

assumed that the groups of children studied have the same potential intellectual capacity, i.e., Intelligence A.

Socio-Economic Status (SES)

Measured intelligence (IQ) has proven to have high correlations (.50-.70) with SES and income (Jensen, 1972). According to Tyler (1965): "The relationship of measured intelligence to socio-economic level is one of the best documented findings in mental test history" (p. 336). Jensen (1972) pointed out that differences between groups of persons in specific occupations, ranked according to prestige hierarchy (which is directly related to income levels of the occupations) showed highly significant differences in IQ or other mental scores. He stressed the high validity of such tests in predicting scholastic performance in school regardless of the culture or socio-economic background.

SES is an important variable affecting mental score and it is important when working with children of different cultures to match experimental groups on socio-economic background. McGuigan (1961) stated, "If the matching variable is highly correlated with the dependent variable, then the equality of the groups is beneficial (p. 151)." Jensen (1973) called this the "sociologists' fallacy". He maintained that the most important "environmental" variable is the IQ of the parent. He further pointed out that a study comparing different minorities with a white group usually compares the whole or majority of the minority culture with the lowest SES of the white group.

Contrary to Jensen, there is a growing body of evidence to support a "Culture of Poverty" concept which cuts across all cultural groups. Oscar Lewis (1970) developed the concept of the "Culture of Poverty"

and described it as a culture which "transcends regional, rural-urban, and national differences and shows remarkable similarities in family structure, interpersonal relations, time orientation, value systems, and spending patterns. These cross-national similarities are examples of independent invention and convergence. They are common adaptations to common problems" (p. 68).

Lewis found it present in societies exhibiting:

> 1. a cash economy, wage labour, and production for profit; 2. a persistently high rate of unemployment and underemployment for unskilled labour; 3. low wages; 4. the failure to provide social, political, and economic organization, either on a voluntary basis or by government imposition, for the low income population; 5. the existence of a bilateral kinship system rather than a unilateral one; and 6. the existence of a set of values in the dominant class which stresses accummulation of wealth and property, the possibility of upward mobility, and thrift, and explains low economic status as the result of personal inadequacy or inferiority. (p. 68)

Lewis described the culture of poverty as both a reaction and adaptation to a marginal position in a class-stratified, individualistic, capitalistic society. Once it exists it tends to perpetuate itself from generation to generation because the children absorb the basic values of the parents and they are not psychologically prepared to take advantage of changing conditions and new opportunities. The persons most affected are the lower levels of a rapidly changing society who are already alienated from it and who can never quite catch up.

Dosman (1972) applied the "concept of poverty" to the native population in Saskatchewan, in the urban centre (Saskatoon) and on the reserves. He stressed:

> Culture or "cultural values" must be seen, not as things or real objects that take root and grow, but as convenient abstractions that help describe the way people live under different situations. A "Culture of Poverty" does not exist as a separate entity. It may help to show why certain groups of people choose a certain way

of living because there is no alternative. (p. 81)

Dosman described the pressures that maintain this situation as unique. These are the organization of the reserves, the availability of slum life on the reserve as well as the city, the reinforcing character of welfare dependency on the reserve and in the city, and the fundamental conflict between Indians and the larger society. Locally, this is characteristic of the Indian population and certain chronically unemployed welfare dependent segments in the white population. The white population experiences less pressures in that they are not as isolated or as identifiable as the Indian population.

Dosman (1972) described the economic deprivation of the Saskatchewan Indian as follows:

> In Saskatchewan in 1969, of a total employable reserve population of 11,634, only 698, or 6.2% had full-time jobs. More than twice this number held some sort of part-time employment, but the income from this employment is not high, given the extreme marginality of traditional part-time occupations such as hunting and fishing. The level of earned income decisively undercuts any notion of Indian reserve prosperity. Out of the Saskatchewan reserve population of 26,000, only 6,000 had a cash income in 1969. 60.7% of these earned less than $1,000; 21.3% between $1,000 and $1,999; 6.6% between $2,000 and $2,999; 5.3% between $3,000 and $3,999; and 6.1% over $4,000. (p. 39)

An American study by Lesser, Fifer and Clark (1965) researched the patterns of mental abilities in 6 and 7-year-old children from different social classes (middle and lower) and different cultural backgrounds (Chinese, Jewish, Negro and Puerto Rican). The major findings were:

1. Differences in social class placement produced significant differences in the absolute level of each mental ability but not significant differences in the patterns among these abilities.

2. Differences in ethnic-group membership produced significant

differences in both the absolute level of each mental ability and the patterns among these abilities.

3. Social class and ethnicity interacted to affect the absolute level of each mental ability but did not interact to affect the patterns among these abilities.

From the above it can be seen that SES exerts a powerful influence on the mental productivity of the child. As the primary purpose of the present research is to demonstrate the usefulness of a certain measure of intelligence, the control of SES is imperative.

Urban-Rural Status

Studies on urban-rural differences have, on the whole, pointed to a significant difference in favor of the urban children, showing that they achieve higher IQs and do better on verbal intelligence than rural children (Jones, Conrad & Blanchard, 1932; Lehmann, 1959; McNemar, 1942).

Lehman (1959) tested the hypothesis that there were no differences in IQ and MA between rural and urban children, and found significant differences in favor of the urban group.

Many of the studies were conducted over 30 years ago (Jones et al, 1932, McNemar, 1942). Even Lehman's study (1959) may no longer be valid in the rapidly changing urban-rural status in which revolutionary changes have occurred in teacher training, and in methods of communication and transportation. The distinction between urban and rural life has been minimized by mobility and communication.

Greenfield (1971) reported a study by Graves (1969) comparing rural with urban Spanish-Americans in the Denver area, and rural with urban Bagandans in Uganda. The results of the study indicated that the rural

child was more able to cope with problems than the lower class urban child. In poor families urbanization profoundly affected the pattern of enterprises to which the preschool child was exposed. It was found that in the urban environment the preschool child was given fewer responsibilities and was more restricted in exploratory activities considered dangerous. City mothers rated their children lower on self-reliance, independence and ability to help in the family. Urbanization was found to be more frustrating which led to more authoritarian techniques of child raising and urban mothers used less future-oriented teaching methods. It was concluded that the urban environment failed to present small children of poor families with the patterns of goal-directed tasks which were typically found in the rural environment.

At the present time urban-rural differences is an area of research in which very little contemporary work exists. In the light of the dynamic changes which are evolving in society, it may be a myth that urban children are brighter than rural children.

Culture-Fair Tests

A frequent criticism of cross-cultural testing is that intelligence and achievement tests have been standardized on white, middle-class children. For this reason, these norms may not be applicable for testing minority children (Vernon, 1969; Jensen, 1971; Sattler, 1972). Culture-biased tests, i.e., IQ and achievement scores have proven to be excellent predictors of scholastic achievement and economic success. Subcultures in the larger society must compete in the same educational system and in the same occupational structure and for the same economic rewards. Vernon (1969) supports the usefulness of such tests to predict

scholastic success but warns, "The fact that culturally-loaded tests can sometimes be used within another cultural group does not justify making comparison between groups" (p. 96).

Jensen (1970, 1973) prefers the term "status bias" to "cultural bias" when dealing with a subculture within a larger society. He pointed out that, from a culture such as ours, a group of children who watch the same TV programs, attend similar schools with similar curriculum, buy the same goods from similar stores, use the same means of transportation, play the same games, etc., must have much more in common culturally than not. Jensen concluded that, where experiential differences did exist, they were largely status differences rather than cultural differences.

The problem of culture bias has always been of high concern to the clinician and researcher. Nearly all attempts to devise culture-free tests have employed the "principal of reducing test context to the lowest common denominator of experiences encountered in the various cultures or social strata across which the test is intended to give a 'fair' assessment of individuals' intelligence". (Jensen, 1970, p. 66)

Attempts to develop culture-fair techniques of intellectual assessment made significant developments in the 1930's through the work of Russell Leiter, J. C. Raven, and Raymond Cattell, leading to the development of the LIPS, Raven's Progressive Matrices, and the Cattell Culture-Fair Intelligence Tests (Hart, 1972). The LIPS was found to cover a broader range of intellectual tasks than the other tests. These tests rely on figural and semantic content and are generally power tests rather than speed tests.

Research has shown that no tests are totally culture-free (Hart, 1972) but tests which proved to be least culturally biased employ simple figural materials requiring subjects to engage in reasoning, influence, generalization, and other basic mental processes in terms of relationships between geometric forms, patterns, etc. (Jensen, 1970).

While it appears that no test can at present be labelled culture-free, some researchers have found that some tests are more culture-biased and others are more culture-free, but the research has been conflicting. Jensen (1971) described the Raven's Progressive Matrices as "the purest measure of the g factor of any of the tests...and is rivaled only by Cattell's Culture Fair Test" (p. 136).

MacArthur (1962) found that the Raven's Progressive Matrices Test was less biased than the Otis, Lorge Thorndike, or the California Test of Mental Maturity (CTMM) for Indian and Metis pupils at Fort Simpson, N.W.T., and termed the test "culture reduced". In contrast, Wiltshire and Gray (1969) tested Indian children from Northern Saskatchewan reserves on the Raven's Progressive Matrices and found that the Indian children were 20 IQ points below the English norms. They cautioned against calling the Raven a culture-free test.

MacArthur (1962) suggested three main practical considerations in measuring intelligence of persons in other cultures. These are a high loading on "g" - a general intellectual ability factor, a minimum bias against persons of non-middle-class-urban-European-American society, and a moderate correlation with school achievement or trade efficiency.

The whole concept of "culture free" testing has been difficult

to establish definitively. The need is clearly evident but as Hart (1972) concluded after an exhaustive review of the field: "The nature of intelligence is not known and there is yet to be substantial agreement on how it or culture-free assessment might be defined". (p. 313)

While a number of tests have been found to be culturally reduced further research in the field is necessary. One of the tests showing promise is the Leiter, which is one of the early attempts to measure intelligence cross-culturally. According to Werner (1965):

> Within the limits of what we presently know about the construction of culture fair tests, the Arthur Scale is a very promising instrument, and has made possible the testing of many children who could not be properly evaluated by the Stanford Binet or the Wechsler Intelligence Scale for Children. Its use in cross-cultural research with young children should be more encouraged. (p. 527)

The Leiter International Performance Scale (LIPS)

The Leiter International Performance Scale (LIPS) was first researched as the 1929 Scale by Leiter at the University of Hawaii and consisted of 12 tests. Through this work, 32 new tests of unknown reliability and validity were added. The new scale consisted of 44 tests and was given to public school children in Honolulu in 1930. This work was financed by a grant to the University of Hawaii by the Rockefeller Foundation to study racial differences. This work culminated in what is known as the 1936 Scale, when Leiter and Porteus published a group of tests which were standardized on 1,430 Chinese and Japanese children between the age of 6 years 6 months, and 16 years 11 months. A Split-half reliability coefficient of .91 was obtained with standard deviations ranging from 13.4 - 17.9 among samples.

Distribution of intelligence quotients was consistent with the assumption that general intelligence in a large unselected population

follows a normal curve. By comparing average CA for each age group and average MA for each age, results supported the assumption that general intelligence was a function of age. The results correlated with the Stanford-Binet (r=.79); Porteous Maze (r=.71); Healy Pictorial Completion Test II (r=.38) and Form and Assembling Test (r=.46). In clinic studies correlations of .80, .73, and .68 were found with the Stanford-Binet with white children and children of other races.

During the six years that Leiter was at the Psychological Clinic at the University of Hawaii, he expanded the scale to 56 tests, which is referred to as the 1938 Scale. This was the form used to secure data for the planned establishment of an international norm. This scale was standardized on Chinese and Japanese children. No Caucasian children were used in Hawaii as these were, at that time, a highly select group, namely, children of professionals receiving special schooling. When this work was compared to white middle class children in the United States, it was found that the differences between Hawaiian Chinese and Japanese and American children were great and Leiter abandoned the idea of an international norm, concentrating instead on the task of developing a scale of tests for Caucasian children. Nevertheless, the scale was a reliable measure for the population to which it was applied. Further research on Mexican children, California-born Japanese children, mentally retarded children also showed a normal distribution of intelligence. Correlation and intercorrelation studies at this time (1938-1940) produced favorable results to support its validity. These were carried out between the 1938 Scale and the Stanford Binet (r=.64); the California Test of Mental Maturity (r=.62); Progressive Achievement Test (r=.57); The Los Angeles Reading Test (r=.56); and Teachers Ratings.

The 1940 Scale resulted from research on the use of the test in psychological clinics in the United States. Some test items of the scale were relocated and new tests above the 10 year level were added. The 1940 Scale consisted of 4 tests at each age level from Year II to Year XVIII. This scale was administered to 280 middle class American white children in California, who were equally distributed between the age of 5 years 0 months, and 12 years 11 months. Comparisons were made with the Stanford Binet and correlation coefficients were .94. Leiter concluded from these data that the 1940 Scale was a valid measure for the population on which it was standardized.

This scale stimulated new research by Leiter and other researchers. The experience with the 1940 Scale by Leiter in the Psychological Clinic at the University of Hawaii, Madeley's application of the scale to Caucasian High School students, and the use in the army during World War II, indicated, in their opinion, that the test would be more efficient at the upper levels if tests were applied only at the even year levels beyond Year X. Further research by Leiter lead to the 1948 Revision. The test stimulated interest and research by other researchers, including Dr. Grace Arthur.

It was at that time that Arthur (1949) pointed out the need for restandardization of the LIPS as it "became evident that the Leiter norms for 'Caucasian' children were too high to enable the average middle class American child to earn a score that adequately represented his level of ability" (Arthur, 1949, p. 345). Certain tasks were eliminated that required acquired skills and the timing of tests was eliminated. The Arthur standardization included Years II to Years XII

and was devised to measure ability of children from 3.0 to 7.99 years of age, as well as the ability of others whose mental age is expected to fall within this range.

The standardization sample consisted of 289 boys and girls ranging in chronological age from 3.0 to 7.99 which Arthur considered furnished "an adequate sampling for the population under consideration, as the first tentative norms were not changed by doubling the number of cases" (Arthur, 1949, p. 346).

The scoring of the Arthur Adaptation follows the mental age scale principle except that a score of:

II.0 yields an M.A. of 2 years 6 months

III.0 yields an M.A. of 3 years 6 months

IV.0 yields an M.A. of 4 years 3 months

V.0 yields an M.A. of 5 years 3 months

VI.0 yields an M.A. of 6 years 3 months

VII.0 yields an M.A. of 7 years 3 months

VIII.0 yields an M.A. of 8 years 3 months

IX.0 yields an M.A. of 9 years 3 months

> These values are used as basal mental ages. Each test passed at the four-year level, earns an additional 2 and 1/4 months of mental age beyond the basal mental age. Each test passed at the 12 year level, earns an additional 6 months of mental age. Every other test passed beyond the basal mental age earns an additional 3 months of mental age. (Arthur, 1949, p. 348)

The Arthur Adaptation pointed out the usefulness of the Leiter tests in filling the gap which previously existed between the top of the infant scales and the lower end of the conventional performance scales.

The changes suggested by Arthur were incorporated by Leiter into

the 1948 Revision. Consequently, the test materials for the Leiter 1948 Revision and the Arthur Adaptation are identical through the 12 year level where the Arthur Adaptation ends. Leiter recognized the necessity of the adjustment and, in the Leiter manual (1959), describes how he makes this same adjustment by adding 5 IQ points to the obtained IQ.

As pointed out by the Psychological Service Centre:

> Clinics desiring to use the Leiter International Performance Scale with children with mental age of 7.99 years or less may use either the Arthur Adaptation or the 1948 Revision. However, those desiring to examine children with mental ages over 7.99 years and adults will have to use the 1948 Revision. The 1948 Revision makes use of the same tests as the Arthur Adaptation through Year XII. Beyond that there are four tests at the XIV level, four at the XVI level, and six at the XVIII level... The amount of material needed will depend on the M.A. range of the subjects to be examined. (Report on the Status of the Arthur Adaptation and the 1948 Revision of the Leiter International Performance Scale, 1949, p. 3)

The standardization of the LIPS has frequently been criticized. (Arthur, 1949; Orgel & Dreger, 1955; Werner, 1965; Sattler, 1974). The LIPS and the Arthur Adaptation of the Leiter International Performance Scale have often been used as research tools and Leiter accumulates his evidence of reliability and validity from numerous sources, rather than from a single thorough standardization procedure:

> The evidences of the reliability and validity of the Leiter tests as measures of general intelligence are found in the various studies in which these tests have been used experimentally...The two types of reliability data were: (a) the comparison of the standard deviation of the new instrument with the standard deviation of one or more accepted instruments, and (b) the coefficients of reliability. The five types of validity data were (a) determination that the obtained results were consistent with the assumption that general intelligence in a large unselected population follows a normal probability distribution, (b) the determination that the obtained results are consistent with the assumption that general intelligence is a function of age,

> (c) the determination that each test in the scale is a valid measure of general intelligence and therefore coherent with the scale as a whole, (d) the findings of significant coefficients of correlation between the new scale and accepted instruments, and (e) the determination that the test results are consistent with the conventional expression of the trait being measured. (Leiter, 1951, p. 1)

The need for an instrument to test children with special problems such as hearing and speech difficulties, mentally retarded children and children with different languages and/or cultures, stimulated various researchers to study the Leiter International Performance Scale and the Arthur Adaptation of the Leiter International Performance Scale (AALIPS)

Uses in Research. One of the early researchers was Bessant (1950) who conducted a study to determine the validity of the Leiter International Performance Scale. Bessant tested 20 subjects of wide chronological age (the middle fifty percent from 9-16 years of age) on both the Leiter International Performance Scale (1940 Edition) and the Revised Stanford Binet. He obtained correlation coefficients of .92 $\pm$ .035 for IQs and .93 $\pm$ .031 for M.A.'s.

Orgel and Dreger (1955) conducted a study to obtain a quantitative assessment of the validity of the AALIPS as a measure of intelligence for children of school entrance age and employed the Revised Stanford Binet Scale (Form L) as the criterion of validity. The correlations ranged from .67 to .75. Generally, the AALIPS produced lower IQ scores than the Binet, with the mean AALIPS IQ of 97.5 as compared to the Binet mean of 108.6. Because of this difference, Orgel and Dreger concluded there were apparently large areas where the AALIPS, due to its construc-

tion, underestimated a child's ability since the test has only four items at each age level, and the penalty for failing an item is 3 months in M.A. - a substantial loss. The authors concluded that, because of the magnitude of the obtained correlations, the AALIPS was a valuable tool for appraising the child with a verbal handicap, and who may otherwise be handicapped by a verbal test such as the Binet.

Alper (1957) made a comparison of the WISC and the AALIPS with mentally defective children. Results obtained were a mean AALIPS IQ of 53.8 and SD of 7.84, and a mean WISC-FS IQ of 54.4 and SD of 6.96. The correlation coefficient between the AALIPS and WISC-FS was .77. Correlation between the AALIPS and WISC-P was .79; between the WISC-F and WISC-V, .67; between WISC-F and WISC-P, .77; and between the WISC-V and WISC-P, .14(not significant).

Sharp (1958) conducted a test-retest design with the LIPS on 48 retarded school children to study the reliability of the LIPS. Subjects ranged from 8 years and 0 months to 16 years and 5 months and the test-retest interval was at least 6 months. Results obtained on the initial test were a mean of 65.1, SD of 13.67, while on the retest, a mean of 67.77, SD of 13.73. A reliability coefficient of .91 indicated both stability and consistency of the LIPS in measuring intelligence at the lower end of the intelligence distribution.

Birch, Stuckless and Birch (1963) investigated the use of the LIPS to predict school success of deaf children. They correlated LIPS scores with school achievement scores and teachers ratings over an 11 year period (1952-1962). The predictive validity of both Leiter Scores and Teacher's

Ratings obtained in 1952 remained relatively high for all achievement criteria obtained in 1962. (r's from .442-.710). Leiter ranks assigned in 1952 correlated .685 with teacher's estimates of achievement in 1955 and .602 with the later estimate in 1962. The predictive validity of the LIPS rating did not significantly decline over a 7 year period. The authors found that significant weight could be given the LIPS in predicting scholastic success in deaf children and there was no significant decrement in correlations between the LIPS and school achievement over an 8-10 year period.

Costello and Dickie (1970) considered the AALIPS as a possible alternative to the Stanford Binet for evaluating intellectual gains resulting from preschool programs for disadvantaged children. They tested 22 black children (mean CA=57 months) in an urban Head Start program using the AALIPS and the Stanford Binet. Correlations between Binet and AALIPS MAs were .79 and IQs .68. The mean Binet IQ was 89 and the mean Leiter IQ was 83 (not significantly different). While the high correlations proved the AALIPS to be a valid substitute, the results did not indicate an obvious advantage of using the AALIPS over the Stanford Binet for the black preschool child.

Spellacy and Black (1972) were interested in assessing intelligence of children with central language impairment (dysarthria) whose major problem is an inability to use language as a means of communication. The Ss were 96 language-impaired children ranging in age from 41 to 120 months, median of 76 months (M=77.3, SD=19.3). Both the LIPS and the Peabody Picture Vocabulary Test (PPVT) were administered. The mean IQ for the LIPS was 84.9 and for the PPVT, 68.8. The two tests showed a

significant correlation of .57. 76% of the children showed a superior LIPS that was maintained at each age. The test-retest reliability of the LIPS (interval of approximately 25 weeks) was .86. The mean IQ scores for Ss remained unchanged over two administrations (83.6 vs. 83.5). Korst (1966), as cited in Spellacy and Black (1972), examined children (mean age 78.8 months, range 48-110) without language impairment and reported that the IQs obtained on LIPS and PPVT did not differ significantly, (mean LIPS IQ=103 and mean PPVT=101). Spellacy and Black concluded that the LIPS may be useful in indicating the intellectual level expected of children who are showing a recovery of language function.

Ollendick, Finch, and Ginn (1974) examined the utility of using the PPVT, and AALIPS as alternatives to the WISC in the prediction of academic achievement with emotionally disturbed children. The correlations between the PPVT IQ and the WISC IQs were as follows: Verbal IQ, r=.56, Performance IQ, r=.53; Full Scale IQ, r=.78. The correlation between the PPVT and AALIPS was .58. The three IQ measurements correlated significantly with academic achievement as measured by the California Achievement Test. The PPVT correlated .61, the AALIPS, .56 and the WISC, .47 respectively. The authors concluded that the PPVT, AALIPS and WISC were equally valid predictors of academic achievement for emotionally disturbed children.

While the LIPS was originally developed for cross-cultural testing and is regarded as a pioneer in the field (Hart, 1972), it is clear from the above literature that little research has been done with respect to its utility in cross-cultural testing. Werner (1965) stressed the

importance of further research of the LIPS in this area.

Purpose of Study

The purpose of this study is to determine whether the non-verbal, non-timed LIPS permits a more adequate assessment of the Indian child than the verbal timed WISC test.

It is hypothesized that there is no difference in measured intelligence between Indian and white children on the LIPS. It is expected that the Indian child does better on the LIPS than on the WISC and differences exist between Indian and white children on the WISC test, particularly the WISC-V. The study tests the validity of the LIPS as an adequate measure of intelligence by correlating it with the WISC and with achievement. The LIPS is expected to correlate higher with the performance part of the WISC than with the verbal part. Since verbal tests have been found to correlate higher than performance tests with achievement (MacArthur, 1966), correlations between LIPS and achievement may not be significant but should result in moderate positive correlations to be of value in predicting school achievement.

METHOD

Subjects

40 subjects were selected consisting of four groups of 10 children. These groups were urban Indian, urban white, rural Indian and rural white. The children ranged in age from 6 years, 5 months to 8 years, 11 months with a mean CA of 7 years 8 months (92 months). These children were in Division I (Grades 1, 2 and 3) of the public school system.

All Indian children were registered Indians which, according to the Indian Act, include those persons descended in the male line from a paternal ancestor of Indian identity, who have chosen to remain under Indian legislation. No Metis children were included. Birthdates and pertinent information were checked with the list of Saskatchewan Indians at the Department of Indian Affairs.

The white children were drawn from the general population.

Urban children are defined as children living in Saskatoon and the urban environment to centers of 100,000 or above (Dosman, 1972). The term urban may have a different connotation when applied to Indian children than to white children by the very nature of the Indian community, where many urban Indian families still have close ties to the reserves.

Rural children refer to children living in rural areas, including farming communities and/or towns and villages.

Testing of urban children was carried out with the permission of the Saskatoon Board of Education. These children attended elementary schools and were in Division I. The urban Indian sample was secured through the Department of Indian Affairs, and all were registered as

Cree, coming from various bands in Saskatchewan and at present living in Saskatoon. The urban Indian group was the most difficult to secure and the urban Indian sample was therefore chosen first. Selection of the subjects took place in the following manner.

Ten age points were established to ensure an even age spread from 6.6 to 8.9 years of age. The children were chosen to match these ages. When 2 or more children fit the criteria, the selection was made on a random basis. This group consisted of 3 boys and 7 girls. The children came from either one-parent families, welfare-dependent families, partly employed——partly welfare-dependent, and unskilled or casual labour.

Urban white children were matched to the first group on age, sex, and SES.

The rural Indian children (total population of 71) attended Paynton Elementary School (Paynton Consolidated School Unit) and Cutknife Elementary School (Wilkie School Unit). These children lived on Poundmaker and Little Pine Reserves (both Cree) situated between Paynton and Cutknife, a distance of 21 miles. The rural Indian group was matched to the urban groups on age, sex, and SES. A small percentage of the Indian families were farm families.

The original rural white sample was chosen from the children (total population of 45) who lived in the towns or on the farms surrounding Paynton and Cutknife. This group was matched on age and sex but SES was difficult to match because the fathers of the rural white group were predominantly farmers and some unskilled and semi-skilled labourers. No rural white families were dependent on welfare. After the datum including the Cutknife rural white sample (see Appendix B, p.70) was examined, it

became apparent that this group had much higher IQ scores than the children in the other three samples (see Appendix B, Table A, p. 71). As this is not supported by other research (Jones, Conrad & Blanchard, 1932; Lehman, 1959; Sattler, 1974) it was apparent that this rural white sample was not an adequate sample or the population an unusual one. Cutknife is a relatively prosperous farming area for the white community. Another white sample was chosen from a different rural area - Duck Lake (pop. 800). These children attended the Stobart Elementary School (Rosthern School Unit). Again sex, age and SES were matched as closely as possible, but the rural white families were similarly predominantly farmers and unskilled workers. Again no rural white families were dependent on welfare but these families farmed and worked in an area significantly less prosperous than the Cutknife area (See Appendix B, Table R , p.95). Z scores (Guilford, 1965) were used to test the differences in means between Economic Class and Size of Farms. The Duck Lake farms were significantly smaller, had lower total capital income and lower value of agricultural products sold than the Cutknife and Paynton farms.

Limitations of time and the individual testing procedure necessitated small groups (n=10). While groups are small, it should be stressed in defense of the procedure, that great care was taken to match the groups on age, sex and SES in order to control for these extraneous variables, thus making the comparisons more meaningful. This type of control technique is referred to by McGuigan (1960) as "purposive manipulation", i.e., the matching of specified extraneous variables which are not of immediate interest in the study but which if allowed to operate in an uncontrolled manner may confound the independent variable and influence the dependent variable.

Techniques of Measurement

The Leiter-1948 Revision (LIPS) and the Arthur Adaptation (AALIPS) were used. The LIPS consists of tests ranging from Year II to Year XVIII (four tests at each level) and tests at only the even years after Year X (i.e., Year XII, Year XIV, Year XVI, and Year XVIII). To test the older children of the sample of Division I children (Grade 1, 2 and 3) the upper limit of the AALIPS was exceeded with the aid of the LIPS, which are identical (Sattler, 1972) up to the 12-year level, except for the method of achieving the age adjustment. As this is achieved at the basal age of the Arthur Adaptation procedure, if the Year XIV level of the LIPS is necessary to establish a ceiling age, no further adjustments are required. The LIPS and AALIPS have a mean IQ of 100 and an SD of 16.

The second intelligence scale used was the WISC, which consists of a Verbal Scale (WISC-V) and a Performance Scale (WISC-P), each consisting of 10 subtests. Raw scores are converted to scaled scores by the age factor. The WISC has a mean IQ of 100 and an SD of 15.

The Wide Range Achievement Test (WRAT) was used to evaluate the childrens' academic achievement. The WRAT consists of three levels. Level I is designed for use with children between the ages of 5 years and 0 months and 11 years and 11 months. It has subtests in Reading (word recognition and pronunciation), written Spelling, and Arithmetic computation, ranging from Grades Nursery (N), Prekindergarten (PK), Kindergarten (K) and Grade 1, 2 and 3, etc., by tenths of a grade, which are converted to scaled scores with a mean of 100 and SD of 15, (Jastak and Jastak, 1965). This is statistically comparable to the IQ score

from the WISC. The WRAT has frequently been used in research to measure achievement in conjunction with psychological testing (Elliott, 1969; Moore & Welcher, 1971; Stewart, Wood & Gaelman, 1971).

Procedure

The subjects were tested by the experimenter and a testing assistant who was a Psychology Honors student, trained in the use of tests under the supervision and direction of two Clinical Psychologists. The experimenter and the assistant had had experience in working with Indian children.

The following procedure was developed to control tester and order effect. Subjects in each group were ranked according to age and were identified by numbers 1 - 10. Subjects 1 - 10 were tested alternatively by testers, each tester administering the test battery to children in similar positions across groups, i.e., one tester tested the even number children across the four groups and the other tester tested the odd numbers across groups.

The test battery of two intelligence tests (LIPS and WISC) and one achievement test (WRAT) was administered. The two intelligence tests were administered first. The order of intelligence tests was alternated to eliminate order effect. The administration time of the WISC was 60 - 90 minutes while the LIPS took approximately 40 - 70 minutes. Each child received a break of 10 - 15 minutes between the intelligence tests. The children were then given a 5 - 10 minute break and were next asked to complete a short achievement test (WRAT, 10 - 15 minutes). Before testing began, as rapport was being established, the children were promised a choice of a roll of life savers or a box of smarties for helping the

testers in the study. All indications were that the children found the testing sessions enjoyable. They were rewarded with the candy of their choice when testing was completed. All children were tested in their respective schools during school hours.

Design and Statistical Analysis

Analysis of variance procedure was used and the design was a 2x2 factorial design. The factors investigated were Culture (Indian-white) and Locale (urban-rural). A separate analysis of variance was done for each intelligence test (WISC-F, WISC-V, WISC-P, and LIPS), and for the WRAT sub-tests (Reading, Arithmetic, Spelling and Composite Achievement). Intelligence scores were expressed in IQ and the WRAT was expressed in standard scores (SS) as derived from the manual (Jastak & Jastak, 1965).

Following the analysis of variance, A-tests (McGuigan, 1960) were done in order to establish where the statistical significant differences occurred between performances by each group on the various tests. The A-test is a modified *t* test to test the differences between means of correlated samples. The four groups were considered correlated because they were matched on age, sex and SES.

In order that the relationships between the various tests could be examined, Pearson Product Moment Correlation Coefficients were computed for the LIPS and WISC (WISC-F, WISC-V, and WISC-P) and for each of the LIPS, WISC-F, WISC-V and WISC-P with Spelling achievement, Arithmetic achievement, Reading achievement and Composite achievement. In addition, the statistical procedure to test that correlations come from a common population (Snedecor, 1956) was employed.

RESULTS

A summary of data is presented in Table 1.

Analysis of Variance

Results of analysis of variance procedures are presented in Tables 2-9. The results in the tables can be summarized as follows:

1. The white children obtained significantly higher IQs on the WISC-V (Table 3) and the WISC-F (Table 2) than the Indian children. Indian and white children did not differ in intelligence on the WISC-P (Table 4) or the LIPS (Table 5).

2. There were no differences between urban and rural groups in intelligence.

3. The white children achieved significantly better than Indian children on Reading (Table 6), Arithmetic (Table 7) and Composite Achievement scores (Table 9). Indian and white children achieved equally well in Spelling (Table 8).

4. There were no urban-rural differences in achievement.

A-tests

A-test results are presented in Tables 10, 11, 12, 13 and 14. The results of the tables can be summarized as follows:

IQ Tests (Table 10)

1. The A-tests showed significant differences in measured intelligence for the Indian child between LIPS and WISC-V and WISC-P and WISC-V indicating that these tests are not equal measures of intelligence for the Indian child. There were no differences between WISC-F and LIPS, and WISC-P and LIPS.

2. There were no differences between the various IQ tests for the

TABLE 1

Mean and Standard Deviation for IQ and Achievement Scores

	Mean IQs & SD				Standard Achievement Scores & SD			
Group *	WISC-F	WISC-V	WISC-P	LIPS	Reading	Arithmetic	Spelling	Composite
Urban Indian	95	85	106	99	97	92	93	92
	SD=8.1	8.8	10.4	16	8.7	10.5	7.3	7.6
Urban White	106	105	106	103	108	100	105	104
	11.4	14.8	9.6	15.4	14.4	5.7	9.2	4.8
Rural Indian	93	86	102	103	103	92	106	100
	12.4	15.4	10	18	12.4	9.2	14.3	10.9
Rural White	119	118	116	115	131	107	124	121
	13.7	15.6	11.6	15.1	17.6	16.1	19.1	15.7
Indian	94	86	104	101	97	92	99	96
	10	12.3	10.2	17.1	12.2	9.6	13	10
White	113	112	111	109	120	103	114	113
	14	16.3	11.7	15.9	19.6	12.3	17.6	14.4
Urban	100	95	106	101	100	96	99	98
	11.2	15.7	9.8	15.9	14.7	9.1	10.2	8.8
Rural	106	102	109	109	117	99	115	111
	18.3	22.3	12.8	17.3	20.7	15	18.9	17.1
Total	103	99	108	105	108	97	107	104
	15.3	19.4	11.3	16.8	19.8	12.4	17.1	14.9

*All Eight Groups had a Mean Chronological Age of 92 months.

TABLE 2

Analysis of Variance of WISC-Full Scale IQ

Source	df	MS	F
Culture (A)	1	1010.03	8.34**
Locale (B)	1	70.23	.58
A x B	1	11.03	.09
Error	36	121.10	

**$p < .01$

TABLE 3

Analysis of Variance of WISC-Verbal Scale IQ

Source	df	MS	F
Culture (A)	1	2205.23	11.73**
Locale (B)	1	156.03	.83
A x B	1	275.63	1.47
Error	36	188.05	

**$p < .01$

TABLE 4

Analysis of Variance of WISC-Performance Scale IQ

Source	df	MS	F
Culture (A)	1	96.10	.90
Locale (B)	1	4.90	.05
A x B	1	115.60	1.08
Error	36	106.64	

TABLE 5

Analysis of Variance of LIPS

Source	df	MS	F
Culture (A)	1	78.40	.30
Locale (B)	1	67.60	.26
A x B	1	12.10	.05
Error	36	264.27	

TABLE 6

Analysis of Variance of Reading Achievement

Source	df	MS	F
Culture (A)	1	1144.90	5.32*
Locale (B)	1	291.60	1.36
A x B	1	476.10	2.21
Error	36	215.27	

*$p < .05$

TABLE 7

Analysis of Variance of Arithmetic Achievement

Source	df	MS	F
Culture (A)	1	384.40	4.51*
Locale (B)	1	36.10	.42
A x B	1	25.60	.30
Error	36	85.26	

*$p < .05$

TABLE 8

Analysis of Variance of Spelling Achievement

Source	df	MS	F
Culture (A)	1	416.03	2.43
Locale (B)	1	570.03	3.32
A x B	1	330.63	1.93
Error	36	171.59	

TABLE 9

Analysis of Variance of Composite Achievement

Source	df	MS	F
Culture (A)	1	2002.23	5.22*
Locale (B)	1	1010.03	1.22
A x B	1	42.03	1.42
Error	36	121.18	

*$p < .05$

TABLE 10

Summary of A-test Results of Differences Between IQ Tests

	WISC-F vs. LIPS	WISC-V vs. LIPS	WISC-P vs. LIPS	WISC-P vs. WISC-V
Indian	M= 94 M=101	M= 86 M=101	M=104 M=101	M=104 M= 86
	A= .36	A=.16**	A= .97	A=.09**
White	M=104 M=104	M=101 M=104	M=108 M=104	M=108 M=101
	A= 1.92	A=.98	A= .93	A=.29
Urban	M=100 M=101	M= 95 M=101	M=106 M=101	M=106 M= 95
	A=11.41	A=.44	A= .24*	A=.16**
Rural	M= 98 M=104	M= 91 M=104	M=106 M=104	M=106 M= 91
	A= .40	A=.31	A=4.01	A=.15**
Total	M= 99 M=103	M= 93 M=103	M=106 M=103	M=106 M= 93
	A= .53	A=.13**	A= .50	A=.08**

*p<.05
**p<.01

TABLE 11

Summary of A-test Results of Differences on Achievement

	Achievement			
	Reading Urban vs. Rural	Arithmetic Urban vs. Rural	Spelling Urban vs. Rural	Composite Urban vs. Rural
Indian	M= 91 M=103 A= .26*	M= 92 M= 92 A=209.0	M= 93 M=106 A= .26*	M= 92 M=100 A=.37
White	M=108 M=106 A=28.45	M=100 M= 96 A= .79	M=105 M=107 A=14.60	M=104 M=104 A=.33

*p $\leq$.05
**p $\leq$.01

TABLE 12

Summary of A-test Results Between IQs

and Achievement for Indian Children

IQ	Achievement			
	Reading M=97	Arithmetic M=92	Spelling M=99	Composite M=96
WISC-F M= 94	A=1.38	A=.86	A= .38	A=2.13
WISC-V M= 86	A= .15**	A=.22*	A= .11**	A= .13**
WISC-P M=104	A= .25*	A=.09**	A= .46	A= .14**
LIPS M=101	A=1.26	A=.22*	A=2.86	A= .50

*$p \leq .05$
**$p < .01$

TABLE 13

Summary of A-test Results Between IQs

and Achievement for White Children

	Achievement			
	Reading M=108	Arithmetic M=98	Spelling M=106	Composite M=104
WISC-F M=104	A= 2.17	A= .23*	A=8.44	A=24.63
WISC-V M=101	A= 1.0	A=1.42	A= .94	A= .89
WISC-P M=108	A=115.52	A= .11**	A=7.22	A= 2.20
LIPS M=104	A= 1.99	A= .27*	A=6.45	A=23.47

*$p < .05$
**$p < .01$

TABLE 14

Summary of A-test Results Between IQs

and Achievement for Total Sample

IQ	Achievement			
	Reading M=102	Arithmetic M=95	Spelling M=103	Composite M=103
WISC-F M= 99	A= .94	A= .35	A= .69	A=3.30
WISC-V M= 93	A= .18*	A=1.24	A= .13**	A= .13**
WISC-P M=106	A= .79	A= .05**	A= .72	A= .20*
LIPS M=103	A=1099.88	A= .12**	A=85.76	A= .59

*$p < .05$
**$p < .01$

white child indicating that the WISC and LIPS tests are equally good measures of intelligence for the white child.

3. Urban children performed significantly differently on WISC-P and LIPS, and WISC-P and WISC-V.

4. Rural children differed significantly on WISC-P and WISC-V.

5. For total sample (n=40) subjects differed significantly on WISC-V and LIPS, and WISC-V and WISC-P.

Achievement (Table 11)

1. Rural Indians achieved significantly better than urban Indians on Reading, and Spelling, but not on Arithmetic or Composite Achievement.

2. There were no differences between urban white and rural white children on any achievement measures.

IQ-achievement comparisons. A-tests computed to compare intelligence and achievement tests are presented in Tables 12, 13, and 14. The results of the Tables are summarized as follows:

1. For Indian children (Table 12) the WISC-V differed from all measures of achievement. The WISC-P differed significantly from Reading, Arithmetic and Composite, but did not differ from spelling achievement. The WISC-F IQ did not differ from scores in Reading, Arithmetic, Spelling and Composite Achievement for the Indian child. The LIPS IQ scores did not differ from scores for Reading, Spelling or Composite Achievement. LIPS scores differed from Arithmetic achievement and overestimated Arithmetic achievement.

2. For white children (Table 13) the WISC-V IQs and LIPS IQs did not differ from achievement scores. WISC-F and WISC-P differed significantly only in Arithmetic achievement, the IQ scores being higher than

scores in Arithmetic achievement.

3. By examining the total sample (n=40; Table 14) it is evident that WISC-F did not differ from Reading, Arithmetic, Spelling or Composite Achievement, therefore WISC-F IQ is similar to achievement scores. WISC-V differed from Reading, Spelling, and Composite Achievement. WISC-V scores were similar to Arithmetic scores. WISC-P operated almost in an opposite manner, differing significantly from Arithmetic and Composite scores and not differing from Reading and Spelling scores. LIPS behaved in a manner similar to the WISC-P but LIPS did not differ from Reading, Spelling and Composite scores but differed from Arithmetic scores.

Correlations

The correlation coefficients are shown in Tables 15 and 16. Correlations may be summarized as follows:

Correlations between IQ Tests (Table 15)

1. In regard to correlations between intelligence tests, total correlations (n=40) between LIPS and WISC-V, LIPS and WISC-P and LIPS and WISC-F were significant indicating that the LIPS is a valid measure of intelligence.

2. Significant correlations were obtained for white children between the LIPS and WISC-V and LIPS and WISC-F. LIPS IQs correlated positively but not significantly with WISC-P.

3. For Indian children, the LIPS IQ scores correlated significantly with WISC-P and with WISC-F but did not correlate significantly with WISC-V.

4. For the rural children the LIPS correlated positively with WISC

TABLE 15

Correlation Coefficients of LIPS IQs and WISC IQs

	WISC IQs			
LIPS IQ	WISC-V	WISC-P	WISC-F	n
Indian	.18	.58**	.44**	20
White	.47*	.30	.50*	20
Rural	.23	.38	.34	20
Urban	.45*	.55**	.62**	20
Rural Indian	-.009	.66*	.28	10
Urban Indian	.52	.57	.75**	10
Rural White	.55	.09	.42	10
Urban White	.50	.53	.61	10
Total	.33*	.46**	.46**	40
Total WISC-V & WISC-P	r=.34*			

*$p < .05$
**$p < .01$

TABLE 16
Correlation Coefficients of IQs and Achievement Scores

		Spelling	Arithmetic	Reading	Composite
Indian Urban	WISC-FS	.22	.35	-.16	.16
	WISC-V	.27	.56	.03	.32
n=10	WISC-P	.06	-.01	-.22	-.04
	LIPS	-.02	.19	-.05	.03
Indian Rural	WISC-FS	.45	.70*	.31	.46
	WISC-V	.29	.50	.13	.25
n=10	WISC-P	.54	.77**	.49	.65**
	LIPS	.27	.26	.15	.29
White Urban	WISC-FS	-.42	.40	-.30	-.14
	WISC-V	-.31	.21	-.17	.12
n=10	WISC-P	-.44	.54	-.50	-.38
	LIPS	-.07	.44	-.09	.22
White Rural	WISC-FS	-.34	.24	-.31	-.27
	WISC-V	-.07	.44	-.01	.02
n=10	WISC-P	-.50	-.12	.62	-.59
	LIPS	.05	.50	.02	.14
Total Indian	WISC-FS	.29	.53*	.09	.30
	WISC-V	.27	.49*	.11	.27
n=20	WISC-P	.18	.34	.05	.23
	LIPS	.21	.22	.12	.22
Total White	WISC-FS	-.35	.32	-.29	-.21
	WISC-V	-.16	.38	-.04	.02
n=20	WISC-P	-.52	.05	-.57	-.49
	LIPS	.01	.43	-.03	.14
Total Urban	WISC-FS	.18	.48*	.14	.37
	WISC-V	.33	.52*	.36	.54**
n=20	WISC-P	-.18	.14	-.30	-.13
	LIPS	.04	.29	.02	.16
Total Rural	WISC-FS	.02	.50*	-.02	.07
	WISC-V	.09	.50*	.08	.15
n=20	WISC-P	-.12	.32	-.18	-.08
	LIPS	.16	.37	.08	.20
Total Sample	WISC-FS	.04	.49**	.03	.15
	WISC-V	.14	.51**	.18	.26
n=40	WISC-P	-.14	.24	-.24	-.10
	LIPS	.13	.32**	.07	.19

*$p < .05$
**$p < .01$

tests but not significantly. Significant correlations were obtained for the urban children between the LIPS and WISC-V, LIPS and WISC-P and LIPS and WISC-F.

5. For the rural Indian children LIPS correlated significantly with WISC-P. Correlations for the urban Indian children were positive but not significant for LIPS and WISC-V, and LIPS and WISC-P. For urban Indian children LIPS correlated significantly with WISC-F. Correlations for LIPS and WISC-IQs were positive but not significant for the rural white and urban white groups.

Correlations between IQ and Achievement. The second classifications of correlations computed between intelligence test scores and achievement scores are presented in Table 16.

1. For the Indian urban child the IQ scores of the various tests correlated erratically with achievement scores. Achievement was unpredictable by WISC-F IQ, WISC-V IQ, and LIPS IQ scores for the Indian urban child.

2. For the Indian rural child all IQ scores correlated consistently positively with achievement, the WISC IQ scores correlating higher than the LIPS with achievement. WISC-F IQ correlated significantly with Arithmetic achievement, and WISC-P correlated significantly with Arithmetic and Composite Achievement.

3. For the urban white child, IQ scores correlated negatively, but not significantly, with Spelling, Reading and Composite Achievement but IQ scores correlated positively, but not significantly, with Arithmetic achievement.

4. For the rural white child, correlations were erratic and usually

negative except for Arithmetic achievement and WISC-F, Arithmetic and WISC-V, and Arithmetic and LIPS which were positive but not significant.

5. For total sample (n=40) WISC-F, WISC-V and LIPS correlated significantly with Arithmetic achievement. The WISC-P did not correlate significantly with Achievement.

6. The test of significance of differences between correlation coefficients (Snedecor, 1956) are presented in Table 17. All correlations between WISC IQs and LIPS IQs and all correlations between IQ scores and achievement scores came from the same population.

TABLE 17

Test of Significant Differences Between Correlation Coefficients among Tests for Subsamples

	LIPS & WISC-F	LIPS & WISC-V	LIPS & WISC-P	LIPS & READ	LIPS & ARITH	LIPS & SPELL	LIPS & COMP. ACH	WISC-F & READ	WISC-F & ARITH	WISC-F & SPELL	WISC-F & COMP	WISC-V & READ	WISC-V & ARITH	WISC-V & SPELL	WISC-V & COMP	WISC-P & READ	WISC-P & ARITH	WISC-P & SPELL	WISC-P & COMP
UI	.75	.52	.57	-.05	.19	-.02	.03	-.16	.35	.22	.16	.03	.56	.27	.32	-.22	-.01	.06	-.04
UW	.61	.50	.53	-.09	.44	-.07	.22	-.30	.40	-.42	-.14	-.17	.21	-.31	.02	-.50	.54	-.44	-.38
RI	.28	-.01	.66	.15	.26	.27	.29	.31	.70	.45	.46	.13	.50	.29	.25	.49	.77	.54	.65
RW	.42	.53	.09	.07	.50	.05	.14	-.31	.25	-.34	-.27	-.01	.44	-.07	+.02	-.62	-.12	-.59	-.59
X^{2*}	1.88	1.79	1.96	.24	.60	.50	.29	1.85	1.52	3.98	2.39	.33	.71	1.81	.53	5.70	6.01	6.11	5.75

UI-Urban Indian, UW-Urban White, RI-Rural Indian, RW-Rural White

* X^2 value to determine significant differences between Correlation Coefficients (Snedecor, 1965)

DISCUSSION AND CONCLUSIONS

From the results, one is able to conclude that there was no difference in intelligence between the Indian and white children except in the verbal area (WISC-V) where the white child did better than the Indian child. This is similar to the findings of Turner and Penhold (1952), Cundick (1970), and the Central Indians in the Schubert and Cropley study (1972). The apparent difference between Indian and white children on the WISC-F is a reflection of the verbal difference.

A possible reason for this verbal deficiency in the Indian child is that their first language is usually not English, but as in the case of the present study, Cree. The urban Indians identify with their bands and have frequently come recently to the city from their reserves. The urban Indians may have been more exposed to English than the rural Indians, but their early preschool years were characterized by varying degrees of exposure to Cree and possibly poorer, first generation English than the white children. Fluency in English for the Indian child differs according to where his reserve is situated. Schubert (1972) demonstrated that the more Northern and isolated the reserve, the less contact with the white community and the English language, the lower the verbal ability of the Indian child. Although the Indian children in the present research spoke English well, their first language was Cree and their verbal thought, i.e., "verbal reflective ability" (Schubert, 1972) may have differed from English-speaking white children. Schubert indicated that the Indian child has less tendency to verbalize to himself when solving problems. While there is evidence (Meichenbaum, 1975) that performance tasks as well as verbal tasks involve verbalizations in the

cognitive process, other processes may be involved where verbal language does not exist as in the case of deaf children who do well on performance tasks. Vernon (1969) states that for the deaf child "much of their reasoning is presumably independent of the verbal 'technique'." (p. 47) While the Indian child could verbalize in Cree and/or English Schubert points out he has less tendency to do so. This would be more detrimental in the verbal tasks than in the performance tasks. The commonly accepted attitudes that the Indian child is less verbal, less competitive and more fearful of making mistakes may be factors in his lower verbal intelligence.

High significant correlations between the LIPS and WISC-F, WISC-V and WISC-P indicate the LIPS is a valid measure of intelligence for the total sample. All tests of intelligence were equally good measures of intelligence for white children. The LIPS, WISC-P and WISC-F were equally good measures of intelligence for Indian children but the WISC-V penalized the Indian child, i.e., it consistently underestimated his intelligence relative to his level of achievement.

For the Indian child, the LIPS correlated significantly with WISC-P and WISC-F IQ scores. Although the F test in Analysis of Variance for WISC-F (Table 2) showed significant differences on the Culture factor between Indian and white children suggesting that the WISC-F penalized the Indian child due to its verbal component, A-tests, comparing how the Indian children did on the LIPS and WISC-F and LIPS and WISC-P indicated no significant differences. As there were no differences for the Indian child on the LIPS, WISC-P and WISC-F, the LIPS does not demonstrate any major advantage in testing the English-speaking Indian child over the WISC-P and less conclusively the WISC-F. The WISC test

may be used in testing the Indian child with fluent English, but the WISC-V must be interpreted with caution for even the English-speaking child. Large discrepancies between WISC-V and WISC-P will influence the WISC-F IQ and should be interpreted with care. For the Indian child from more Northern and/or isolated reserves who is less fluent in English, the suitability of the WISC is questionable and should be investigated. It is important to emphasize that in the case of the individual child where the WISC-V may influence the WISC-F to a large degree, the erroneous labelling of a child with "low intelligence" can be serious as it may mold the child's curriculum in an inappropriate direction. In the case of the non-English speaking Indian child, usually in the junior grades (kindergarten and Grade 1) on the Northern isolated reserves, the LIPS would be the better choice of instrument for measuring intelligence if such an estimate were required.

The white child achieved consistently better than the Indian child in Reading, Arithmetic and Composite Achievement, but Indian and white children were equal in Spelling achievement. A possible reason for the Indian child's poor achievement could be his poor school attendance. The attendance for the urban Indian child was the poorest, some children in the sample missing approximately 1/3 of the school days. Attendance for the rural Indian child was also poor and was influenced by heavy snowfalls and spring floods, etc.

Another factor affecting achievement may be that the traditional attitudes towards education differ between the Indian and white population and may affect motivation for the Indian child. While it is true that in some of the more remote Northern Indian settlements, the attitude towards education is that their children go to school to learn the English language

and that they expect no other benefit for their children, the parents from Poundmaker and Little Pine reserves are progressive and are interested, concerned and involved in the education of their children. Their concerns regarding their children's education, motivation and future are similar to that expressed by all parents. Nevertheless, this is a new and developing attitude of this generation of parents and not of the generations before. It is not a traditional attitude as it is for the white population. Therefore, motivation to succeed may differ because of traditional attitudes towards education.

The Education system is assumed constant for all areas in which testing took place. When considering the Cutknife rural white group in Appendix B, achievement was consistently high and could be accounted for by the high intelligence scores. When considering the Duck Lake rural white group with average intelligence, rural achievement was equal to urban achievement.

The rural Indian child achieved higher in Reading and Spelling than the urban Indian child, although the urban Indian was as intelligent as the rural Indian. There are several possible reasons for this:

1. The rural Indian child has a more stable length of residency on the reserve while the urban Indian child is frequently moving (Dosman, 1972).

2. Another possible factor affecting achievement is that the rural Indian's family is more stable on the reserve than the urban Indian's family in the city. The urban Indian is more often a single parent family. They are frequently welfare-dependent and the stigma of welfare is more acute in the urban community than in the reserve community.

3. The rural Indian children were the majority in their school while the urban Indian children were the minority in their school. The

rural Indian children were therefore probably more psychologically able to cope in that they are happier and more emotionally stable with good identification with the peer group.

4. It is possible that rural achievement is better because the rural teachers in the Cutknife-Paynton schools were more experienced teachers in that they had on the whole, been teaching for longer periods of time and have had years of experience teaching Indian children. The urban teachers in the lower grades are frequently the newer and less experienced teachers and they have less experience in teaching Indian children.

In overall correlation (n=40), the LIPS IQ has proven to be as good as the WISC IQs in predicting achievement. The LIPS correlated as well as the WISC IQs with achievement score and generally better with achievement than the WISC-P. For individual samples (n=10), prediction accuracy varied. No IQ scores predicted achievement for the urban white, urban Indian, and the rural white group. For the rural Indian children the WISC-F and WISC-P predicted composite achievement. For total Indian the WISC-F and WISC-V predicted arithmetic achievement.

The present research indicates no difference in the rural-urban status of intelligence and achievement. Available studies (Lehman, 1959; Tyler, 1965; Sattler, 1972) have shown rural children to be of lower SES, lower intelligence and lower academic achievement than urban children which was not supported by the present research, but sample sizes were small. The rural children were equal in intelligence and achievement to the urban children. This is an interesting area for further research as it is plausible that the common attitude of urban superiority may no longer reflect the contemporary urban-rural scene. It was difficult to find an

economically depressed rural community in an easily accessible area to match the urban or reserve family on welfare. It is possible that the socio-economic condition of the farmer has changed and modified the pattern of rural life. Perhaps the trend towards larger and more specialized farms has shifted the rural-urban population in the last 10-15 years. The possibility presents itself that the more successful farmers were the more intelligent farmers and were able to extend their farms into bigger businesses. The less successful farmers may have been less adaptive (intelligent) farmers who managed their farms less efficiently. The poorer farmers were forced to sell their farms and move to towns or cities in search of employment. It is possible that over the last 20 years, in a period of larger and larger farms the more intelligent person has been the more successful farmer and able to compete successfully in the complex of big business farming which characterizes the contemporary rural scene in the most fertile farming areas. In the more marginal farming areas the small, less economically viable farms have persisted. Since the Duck Lake rural white sample was similar to the Cutknife sample (See Appendix B) except for SES, the difference in measured intelligence suggested that SES was an important factor in intelligence testing. This is similar to reports by Jensen (1970) and Tyler (1965).

In summary, the LIPS did not prove to be fairer to the English-speaking Indian child than the WISC-P or WISC-F and did not demonstrate utility over the WISC-F scale for the Indian child. The LIPS is fairer to the Indian child than the WISC-V. The WISC may be used with English-speaking Indian children but the WISC-V should be interpreted with caution.

Overall, the LIPS correlated highly with the WISC tests proving it

is a valid measure of intelligence. For the Indian child, the LIPS correlated positively and moderately with achievement but not significantly. The WISC tests were good predictors of Arithmetic achievement for the Indian child. The WISC had this advantage over the LIPS, in that it predicted achievement better than the LIPS for the Indian child.

No urban-rural differences in intelligence were found. An incidental aspect of the study was the difficulty in matching subjects on the SES factor which led to the hypothesis that the socio-economic factor is an important variable in intelligence testing. The SES factor was confounded with the urban-rural variable. Research on SES, urban-rural-reserve communities, and racial-ethnic backgrounds is scanty and consequently no clear-cut postulates on these variables have been developed. The same is true of the whole field of culture fair tests. Investigations are frequently disjointed, unco-ordinated and conflicting and evidence for cultural fairness is unorganized. Results often give the appearance of being culture free, but present investigations give only enough support to produce hope for eventually producing culture free techniques (Hart, 1972). It would appear that MacArthur's (1962 and 1965) approach of establishing norms specific to the Indian culture is the most fruitful for short-term practical purposes, but not necessarily for the goals of developing culture-fair measures of intelligence. A possibly more rewarding direction of culture-fair research may be the measurement of learning potential for new material - a measurement of cognitive efficiency.

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APPENDIX

APPENDIX A

Description of LIPS and AALIPS

The LIPS (and the AALIPS) is a completely non-verbal performance test ranging from young children to adult. It requires no verbalization - the instructions are given by example or pantomine, which makes it especially useful for testing children with hearing and speech difficulties, mentally retarded children, and children with different languages and/or cultures. The test has no time limits. It is a continuous scale reaching down to lower chronological levels than other performance scales. The lower levels of the scale test ability to learn, rather than testing acquired skills or already learned material.

The equipment consists of a response frame with an adjustable card holder. Tests are administered by attaching the appropriate picture strip to the frame, supplying the appropriate blocks, and explaining by example or pantomining the directions. The child chooses the correct matching blocks and inserts them into the wooden frame in the appropriate stalls or notches. The types of tasks range from matching colors and forms to combinations of color, form, and number, to completions of patterns, block designs, analogous designs and more abstract classifications of objects. A good deal of perceptual organization and discrimination is required.

APPENDIX B

Results of Analysis of Data with Cutknife Rural White Sample

A summary of data is presented in Table A.

Analysis of Variance

Results of analysis of variance are presented in Tables B-I. The results can be summarized as follows:

1. The white children obtained significantly higher IQs on the WISC-F (Table B), on the WISC-V (Table C), and on the WISC-P (Table D). White and Indian children performed equally on the LIPS (Table E).

2. There were no differences between urban and rural groups in intelligence.

3. Significant interactions between the culture and locale occurred on the WISC-F (Figure A) and WISC-P (Figure B). Tests for simple main effects were computed for WISC-F and WISC-P. These analyses indicated that while rural and urban Indian children performed equally well on the WISC-F, rural white performed significantly higher than urban white children, $F(1, 36)=6.37$, $p<.05$; rural white children performed significantly better than rural Indian children, $F(1, 36)=25.47$; $p<.01$; and urban white children significantly better than urban Indian children, $F(1, 36)=4.56$, $p<.05$. On the WISC-P, the rural and urban Indian children obtained similar scores but the rural white children obtained significantly higher IQs than the rural Indian children, $F(1, 36)=7.39$, $p<.05$.

4. The white children achieved significantly better than Indian children on Reading (Table F), Arithmetic (Table G), Spelling (Table H), and Composite Achievement (Table I).

5. Rural children achieved significantly better than urban children

TABLE A

Mean and Standard Deviation for IQ and Achievement Scores

	Mean IQs and SD				Achievement Scores			
Group *	WISC-F	WISC-V	WISC-P	LIPS	Reading	Arithmetic	Spelling	Composite
Urban Indian	95 SD=8.1	85 8.9	106 10.4	99 16.1	91 8.7	92 10.5	93 7.3	92 7.6
Urban White	106 11.4	105 14.8	106 9.6	103 15.4	108 14.4	100 5.7	105 9.2	104 4.8
Rural Indian	93 12.4	86 15.4	102 10	103 18	103 12.4	92 9.2	106 14.3	100 10.9
Rural White	102 11.9	96 14.7	109 11.2	105 14.6	107 20.6	96 10.7	107 18.6	103 28.5
Indian	94 10.0	86 12.3	104 10.2	101 17.1	97 12.2	92 9.6	99 13	96 10
White	104 11.5	101 15.1	108 10.3	104 14.6	108 17.3	98 8.5	106 14.3	104 21
Urban	100 11.2	95 15.7	106 9.8	101 15.9	100 14.7	96 9.1	99 10.2	98 8.8
Rural	98 12.6	91 15.5	106 10.9	104 15.9	105 16.7	94 10	106 16.1	102 22.6
Total	99 11.8	93 15.5	106 10.2	103 15.8	102 15.7	95 9.5	103 13.9	100 11.7

*All Groups had a mean CA of 92 months.

TABLE B

Analysis of Variance of WISC-Full Scale IQ

Source	df	MS	F
Culture (A)	1	3441.03	25.93**
Locale (B)	1	342.23	2.58
A x B	1	555.02	4.18*
Error	36	132.71	

*$p < .05$
**$p < .01$

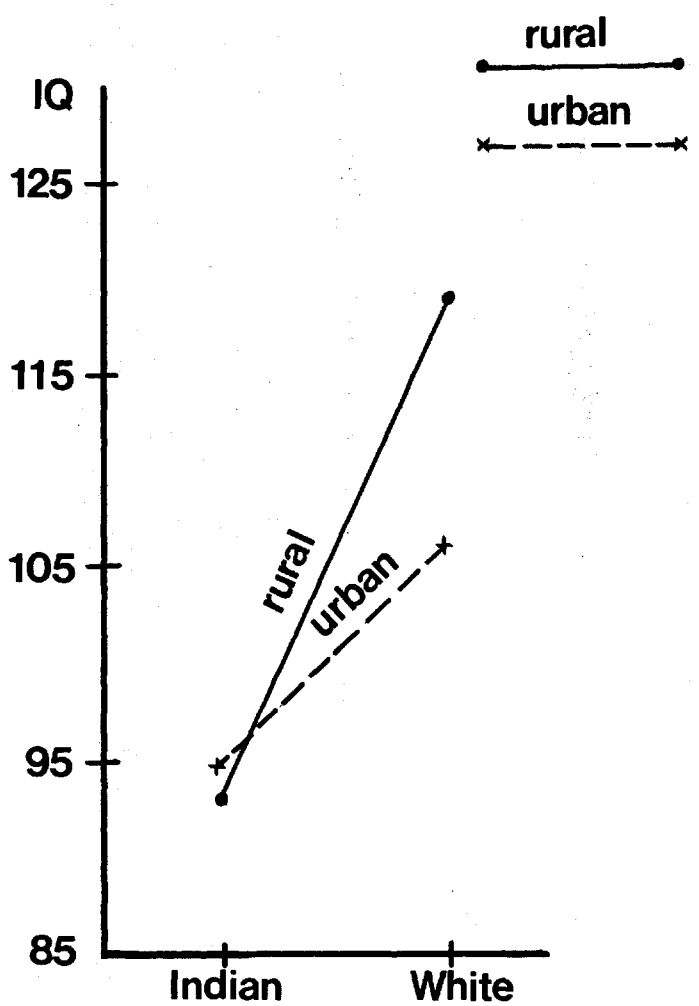

Figure 1. Interaction,* Mean scores for WISC-F
*$\rho < .05$

TABLE C

Analysis of Variance of WISC-Verbal Scale IQ

Source	df	MS	F
Culture (A)	1	6760.00	34.65**
Locale (B)	1	518.40	2.66
A x B	1	348.10	1.79
Error	36	195.07	

**$p < .01$

TABLE D

Analysis of Variance of WISC-Performance Scale IQ

Source	df	MS	F
Culture (A)	1	469.23	4.31*
Locale (B)	1	93.03	.85
A x B	1	511.23	4.69*
Error	36	108.99	

*$p < .05$

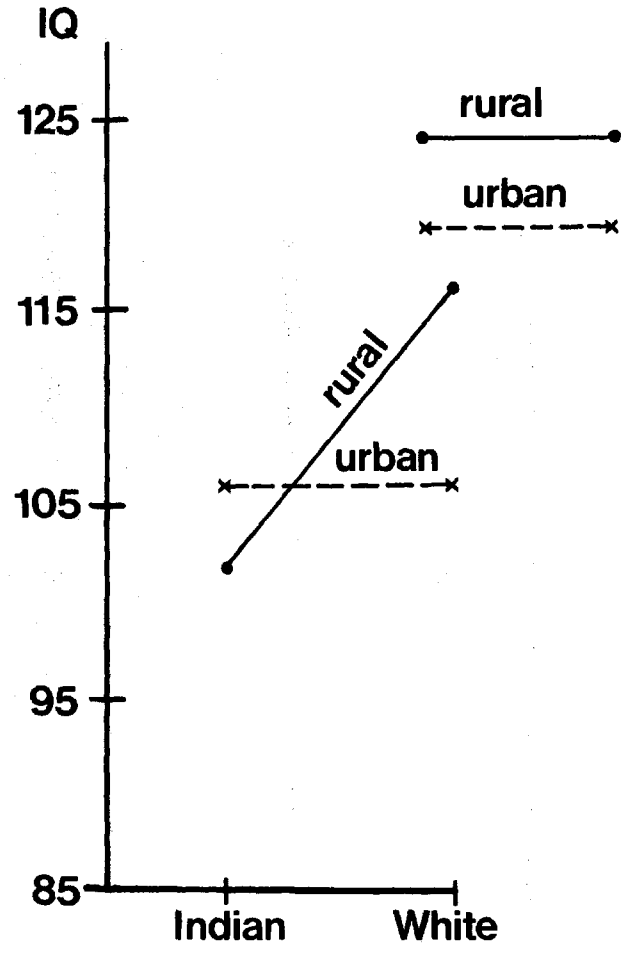

Figure 2. Interaction*, Mean scores for WISC-P

*$p < .05$

TABLE E

Analysis of Variance of LIPS

Source	df	MS	F
Culture (A)	1	600.63	2.24
Locale (B)	1	570.03	2.12
A x B	1	148.23	.55
Error	36	268.39	

TABLE F

Analysis of Variance of Reading Achievement

Source	df	MS	F
Culture (A)	1	5244.10	28.10**
Locale (B)	1	3097.60	16.60**
A x B	1	280.90	1.51
Error	36	186.66	

**$p < .01$

TABLE G

Analysis of Variance of Arithmetic Achievement

Source	df	MS	F
Culture (A)	1	1345.60	11.07**
Locale (B)	1	122.50	1.01
A x B	1	144.40	1.19
Error	36	121.59	

**$p < .01$

TABLE H

Analysis of Variance of Spelling Achievement

Source	df	MS	F
Culture (A)	1	2280.10	12.91**
Locale (B)	1	2624.40	14.56**
A x B	1	84.10	.48
Error	36	176.66	

**$p < .01$

TABLE I

Analysis of Variance of Composite Achievement

Source	df	MS	F
Culture (A)	1	2788.90	25.01**
Locale (B)	1	1587.60	14.24**
A x B	1	211.60	1.90
Error	36	111.53	

**$p < .01$

on Reading (Table F), Spelling (Table H), and Composite Achievement (Table I). Urban and rural groups did equally well on Arithmetic achievement (Table G).

A-tests

A-tests results are presented in Tables J, K, L, M and N. The results of the tables can be summarized as follows:

IQ Tests (Table J)

1. The A-tests showed significant differences in measured intelligence for the Indian children between the WISC-V and LIPS, and WISC-V and WISC-P: the Indian child achieved higher LIPS IQ than WISC-V IQ and higher WISC-P than WISC-V.

2. There were no differences between the various IQ scores for the white children indicating that they were equally good measures of intelligence for the white child.

3. For the urban children no differences exist between the LIPS and WISC-F or LIPS and WISC-V scores, but significant differences were obtained between the LIPS and WISC-P and the WISC-V and WISC-P scores.

4. No differences were obtained between the IQ tests for the rural children.

5. For total sample (n=40) no differences existed between LIPS and WISC-F scores and LIPS and WISC-P scores. Significant differences existed between LIPS and WISC-V and WISC-P and WISC-V scores.

Achievement (Table K)

1. Rural Indians achieved significantly better than urban Indians on Reading and Spelling, but not on Arithmetic or Composite Achievement.

2. Rural white children achieved significantly better than urban

TABLE J

Summary of A-test Results of Difference Between IQ Tests

Tests	WISC-F vs. LIPS	WISC-V vs. LIPS	WISC-P vs. LIPS	WISC-P vs. WISC-V
Indian	M= 94 M=101 A= .36	M= 86 M=101 A= .16**	M=104 M=101 A= .97	M=104 M= 86 A= .09**
White	M=113 M=109 A= .52	M=112 M=109 A=1.20	M=111 M=109 A= 1.46	M=111 M=112 A=7.68
Urban	M=100 M=101 A=11.41	M= 95 M=101 A= .44	M=106 M=101 A= .24*	M=106 M= 95 A= .16**
Rural	M=106 M=109 A= 9.45	M=102 M=109 A=1.65	M=109 M=109 A=31.51	M=109 M=102 A= .58
Total	M=103 M=105 A= 1.73	M= 99 M=105 A= .25*	M=108 M=105 A= .60	M=108 M= 99 A= .13**

*p<.05
**p<.01

TABLE K

Summary of A-test Results of Differences on Achievement

	Achievement							
	Reading Urban vs. Rural		Arithmetic Urban vs. Rural		Spelling Urban vs. Rural		Composite Urban vs. Rural	
Indian	M= 91	M=103	M= 92	M= 92	M= 93	M=106	M= 92	M=100
	A=.26*		A=209.0		A= .26*		A=.37	
White	M=108	M=131	M=100	M=107	M=105	M=124	M=104	M=121
	A=.17*		A= .46		A= .18**		A=.18**	

*p $<$.05
**p $<$.01

TABLE L

Summary of A-test Results Between IQs and Achievement

for Indian Children

	Achievement			
IQ	Reading M=97	Arithmetic M=92	Spelling M=99	Composite M=96
WISC-F M= 94	A=1.38	A=.86	A= .38	A=2.13
WISC-V M= 86	A= .15**	A=.22*	A= .11**	A= .13**
WISC-P M=104	A= .25*	A=.09**	A= .46	A= .14**
LIPS M=101	A=1.26	A=.22*	A=2.86	A= .50

*p $<$.05
**p $<$.01

TABLE M

Summary of A-test Results Between IQs and

Achievement for White Subjects

	Achievement			
IQ	Reading M=120	Arithmetic M=103	Spelling M=114	Composite M=113
WISC-F M=113	A=.37	A=.14**	A= 3.81	A=47.34
WISC-V M=117	A=.29	A=.18*	A=10.60	A=11.23
WISC-P M=111	A=.33	A=.19*	A=13.19	A= 2.31
LIPS M=109	A=.32	A=.27	A= .55	A= .73

*$p < .05$
**$p < .01$

TABLE N

Summary of A-test Results Between IQs

and Achievement for Total Sample

	Achievement			
IQ	Reading M=108	Arithmetic M=97	Spelling M=107	Composite M=104
WISC-F M=103	A= .30	A= .12**	A= .42	A=7.38
WISC-V M= 99	A= .10**	A=7.38	A= .16**	A= .18*
WISC-P M=108	A=34.96	A= .06**	A= .70	A= .55
LIPS M=105	A= 1.90	A= .12**	A=3.54	A=2.90

*$p < .05$
**$p < .01$

white children on Reading, Spelling and Composite Achievement. Arithmetic achievement was equal for urban and rural white children.

IQ-Achievement comparisons. A-tests were conducted between intelligence scores and achievement standard scores (Tables L, M and N) for all groups.

1. For the Indian children (Table L), the WISC-V IQs differed significantly from all measures of achievement. The WISC-V scores were consistently lower than achievement scores. The WISC-P IQ differed significantly from Reading, Arithmetic and Composite Achievement. The WISC-P scores were higher than achievement scores except for Spelling scores, where the WISC-P IQ did not differ from Spelling achievement. The WISC-F IQ did not differ significantly from the scores for Reading, Arithmetic, Spelling and Composite Achievement for the Indian children. Since the WISC-F takes into account the WISC-V and WISC-P, the low WISC-V scores and the high WISC-P scores, when added, resulted in a more moderate WISC-F scores between the two which did not differ from achievement scores. The LIPS IQ score did not differ from scores in Reading, Spelling or Composite Achievement, but did differ significantly from the Arithmetic achievement scores; the Indian children obtaining higher LIPS IQs than Arithmetic scores.

2. For the white children (Table M), the WISC-V, WISC-P and WISC-F did not differ significantly from Reading, Spelling and Composite Achievement. The WISC tests differed significantly from Arithmetic achievement. The Arithmetic scores were significantly lower than measured intelligence. For the white children the LIPS IQs were similar to all achievement scores.

3. By looking at the total sample (n=40, Table N) some interesting

patterns occur. The WISC-F, WISC-P and LIPS IQ scores did not differ significantly from Reading, Spelling and Composite Achievement while the WISC-F, WISC-P and LIPS IQ scores differed significantly from scores in Arithmetic achievement. The WISC-V behaved in an opposite manner. The WISC-V differed significantly from Reading, Spelling and Composite Achievement, but did not differ significantly from scores in Arithmetic achievement.

Correlations

The correlation coefficients are presented in Tables O and P. Correlations may be summarized as follows:

Correlations between IQ tests (Table O).

1. In examining correlations between intelligence tests, total correlations (n=40) between LIPS and WISC-V, LIPS and WISC-P and LIPS and WISC-F were all significant, indicating that the LIPS was validly measuring the same general factor of intelligence as the WISC.

2. LIPS and WISC scores correlated significantly for white children, indicating that the LIPS and WISC tests were equally good measures of intelligence for the white child.

3. For the Indian children LIPS correlated significantly with the WISC-P and the WISC-F; but not with the WISC-V indicating that the WISC-V did not adequately measure intelligence for the Indian child.

4. Significant correlations for rural (n=20) and urban children (n=20) were obtained between the LIPS IQ and WISC-V IQ; LIPS and WISC-P and LIPS and WISC-F.

Correlations between IQ and achievement (Table P).

1. In examining correlations between intelligence tests scores

TABLE O

Correlation Coefficients of LIPS and WISC IQs

	WISC IQs			
LIPS IQ	WISC-V	WISC-P	WISC-F	n
Indian	.18	.58**	.44*	20
White	.65**	.63**	.71**	20
Rural	.46*	.67**	.56**	20
Urban	.45*	.55**	.62**	20
Rural Indian	-.009	.66*	.28	10
Urban Indian	.52	.57	.75**	10
Rural White	.67*	.58	.70*	10
Urban White	.50	.53	.61	10
Total	.47**	.63**	.59**	40
Total	WISC-V & WISC-P		$\underline{r}$=.54**	

*p<.05
**p<.01

TABLE P

Correlation Coefficients of IQs and Achievement Scores

		Spelling	Arithmetic	Reading	Composite
Indian Urban	WISC-FS	.22	.35	-.16	.16
	WISC-V	.27	.56	.03	.32
n=10	WISC-P	.06	-.01	-.22	-.04
	LIPS	-.02	.19	-.05	.03
Indian Rural	WISC-FS	.45	.70*	.31	.46
	WISC-V	.29	.49	.13	.25
n=10	WISC-P	.54	.77**	.49	.65*
	LIPS	.27	.26	.15	.29
White Urban	WISC-FS	-.42	.40	-.30	-.14
	WISC-V	-.31	.21	-.12	.02
n=10	WISC-P	-.44	.54	-.50	-.38
	LIPS	-.07	.44	-.09	.22
White Rural	WISC-FS	.69*	.52	.50	.64*
	WISC-V	.78**	.66*	.68*	.78**
n=10	WISC-P	.40	.20	.13	.28
	LIPS	.52	.72*	.62*	.69*
Total Indian	WISC-FS	.29	.53*	.09	.30
	WISC-V	.27	.49*	.12	.27
n=20	WISC-P	.18	.34	.05	.23
	LIPS	.21	.22	.12	.22
Total White	WISC-FS	.53*	.53*	.42	.60**
	WISC-V	.54**	.56*	.49*	.64**
n=20	WISC-P	.36	.36	.18	.37
	LIPS	.44*	.63**	.44*	.60**
Total Urban	WISC-FS	.18	.48*	.14	.37
	WISC-V	.33	.52*	.36	.54**
n=20	WISC-P	-.18	.14	.30	-.13
	LIPS	.04	.29	.02	.16
Total Rural	WISC-FS	.71**	.71**	.72**	.76**
	WISC-V	.69**	.72**	.73**	.76**
n=20	WISC-P	.60**	.56**	.55**	.62**
	LIPS	.49*	.58**	.51*	.58**
Total Sample	WISC-FS	.59**	.66**	.56**	.68**
	WISC-V	.60**	.67**	.62**	.70**
n=40	WISC-P	.39**	.44**	.28	.42**
	LIPS	.39**	.49**	.38**	.47**

*$p < .05$
**$p < .01$

and achievement scores, it was found that for the Indian urban children, IQ scores of the various intelligence tests correlated erratically with achievement scores. Achievement was unpredictable by WISC-F IQ, WISC-V IQ, WISC-P IQ and LIPS IQ scores for the Indian urban child.

2. For the Indian rural children all IQ scores correlated consistently positively with achievement, the WISC IQ scores correlated higher than the LIPS with achievement. WISC-F IQ correlated significantly with Arithmetic achievement; WISC-P correlated significantly with Arithmetic achievement and Composite Achievement. The LIPS correlated positively, but not significantly with achievement sub-tests.

3. For the urban white children, IQ scores correlated negatively, but not significantly with Spelling, Reading and Composite Achievement but IQ scores correlated positively, but not significantly with Arithmetic achievement.

4. For the rural white children, correlations between IQ scores and achievement were consistently high: WISC-F correlated significantly with Spelling and Composite Achievement. WISC-V correlated significantly with Spelling, Arithmetic, Reading, and Composite Achievement. Correlation between WISC-P and achievement were not significant. Significant correlations resulted between LIPS and Arithmetic, Reading and Composite Achievement.

5. For total sample (n=40), WISC-F, WISC-V, and LIPS correlated significantly with Spelling, Arithmetic, Reading and Composite Achievement. WISC-P correlated significantly with Spelling, Arithmetic, and Composite

Achievement, but not with Reading.

6. The test of significance of differences between correlation coefficients (Snedecor, 1956) are presented in Table Q. All correlations between WISC IQs and LIPS IQs and all correlations between IQ scores and achievement scores came from the same population.

TABLE Q

Test of Significant Differences Between Correlation Coefficients among Tests for Subsamples

	LIPS & WISC-F	LIPS & WISC-V	LIPS & WISC-P	LIPS & READ	LIPS & ARITH	LIPS & SPELL	LIPS & COMP. ACH	WISC-F & READ	WISC-F & ARITH	WISC-F & SPELL	WISC-F & COMP	WISC-V & READ	WISC-V & ARITH	WISC-V & SPELL	WISC-V & COMP	WISC-P & READ	WISC-P & ARITH	WISC-P & SPELL	WISC-P & COMP
UI	.75	.52	.57	-.05	.19	-.02	.03	-.16	.35	.22	.16	.03	.56	.27	.32	-.22	-.01	.06	-.04
UW	.61	.50	.53	-.09	.44	-.07	.22	-.30	.40	-.42	-.14	-.12	.21	-.31	.02	-.50	.54	-.44	-.38
RI	.28	-.01	.66	.15	.26	.27	.29	.31	.70	.45	.46	.13	.49	.29	.25	.49	.77	.54	.65
RW	.70	.67	.58	.62	.72	.52	.69	.50	.52	.69	.64	.68	.66	.78	.78	.13	.20	.40	.28
X^{2*}	1.89	2.59	.20	3.01	2.19	1.90	2.61	3.36	1.06	6.01	3.19	3.71	1.26	6.52	4.13	4.25	4.35	4.42	5.13

UI-Urban Indian, UW-Urban White, RI-Rural Indian, RW-Rural White

*X^2 value to determine significant differences between Correlation Coefficients (Snedecor, 1965)

TABLE R

Z Scores to Test Significance of Differences

in Economic Class and Size of Farm*

	Value of Agricultural Products Sold		Size of Farms(Acres)			Average Farm Capital
	Under 2,500	Over 5,000	759 or Less	760-1599	16,000 and Over	
Cutknife vs. Duck Lake	3.64**	4.42**	2.97**	1.89**	1.34	20**
Duck Lake vs. Indian Farms	7.68**	5.60**	5.00**	10.29**		
Cutknife vs. Paynton	.78	1.46	2.47**	3.38**	3.13**	8.51**
Paynton vs. Duck Lake	1.27	3.77**	.17	1.80*	3.32**	8.00**

*$p < .05$
**$p < .01$

*1971 Census-Saskatchewan.